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```

% Problem 4
load pca_data;
[m, n] = size(X);

% Plotting the original data
scatter(X(1, :), X(2, :), '.g');
hold on;
title('Problem 4');

% Part A
centroid = mean(X, 2);
Xm0 = zeros(m, n);
Xm0(1, :) = X(1, :) - centroid(1);
Xm0(2, :) = X(2, :) - centroid(2);
fprintf('Covariance matrix of X:\n');
C = 1/n * Xm0 * (Xm0')

% Part B
[V, D] = eig(C);
syms t
x = centroid(1) + t * V(1, 1);
y = centroid(2) + t * V(2, 1);
fplot(x, y, '-k');
x = centroid(1) + t * V(1, 2);
y = centroid(2) + t * V(2, 2);
fplot(x, y, '-k');

% Part C
Y = inv(V) * X;
centroidY = mean(Y, 2);
Ym0 = zeros(m, n);
Ym0(1, :) = Y(1, :) - centroidY(1);
Ym0(2, :) = Y(2, :) - centroidY(2);
fprintf('Covariance matrix of Y:\n');
Cy = 1/n * Ym0 * (Ym0')

% Part D
Vm = pca(X');
fprintf('Matlab pca():\n');
disp(Vm)
fprintf('My components:\n');
disp(V)

```

Covariance matrix of X:

C =

```

    0.9829    -0.6808
   -0.6808     1.9508

```

Covariance matrix of Y:

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$Cy =$

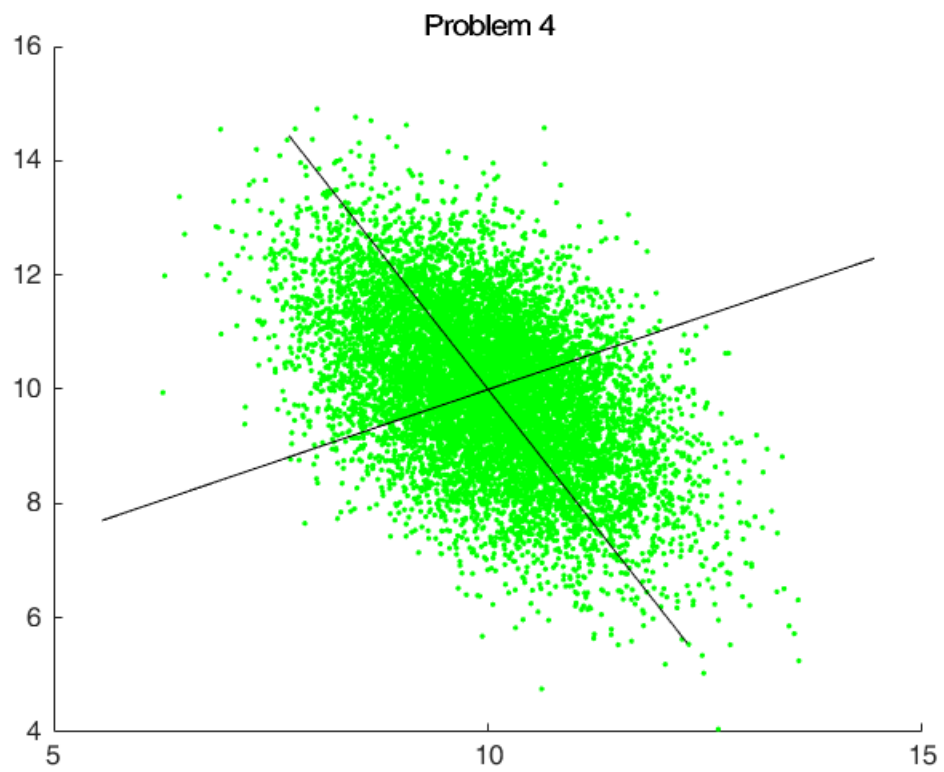
|         |         |
|---------|---------|
| 0.6316  | -0.0000 |
| -0.0000 | 2.3021  |

Matlab `pca()`:

|         |        |
|---------|--------|
| -0.4586 | 0.8886 |
| 0.8886  | 0.4586 |

My components:

|         |         |
|---------|---------|
| -0.8886 | -0.4586 |
| -0.4586 | 0.8886  |



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